



Preparing for Facilities Readiness

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NASA Mission:

To pioneer the future in space exploration, scientific discovery, and aeronautics research.

NASA's Strategic Goals

1. Fly the Shuttle as safely as possible until its retirement, no later than 2010.
2. Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.
3. Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
4. Bring a new Crew Exploration Vehicle into service as soon as possible after Shuttle retirement.
5. Encourage the pursuit of appropriate partnerships with the emerging commercial space sector.
6. Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.

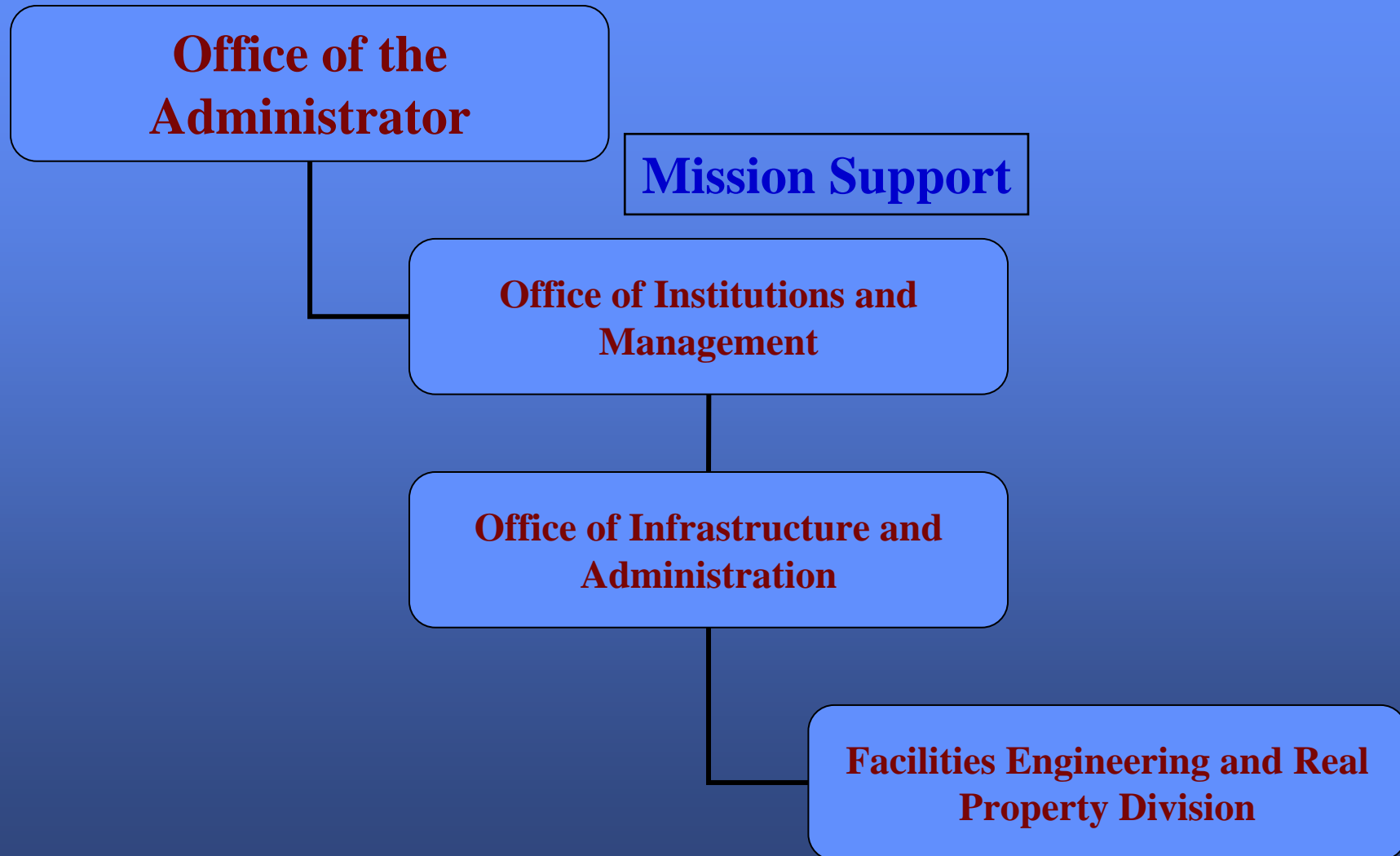


Presentation Objectives

- **NASA Facilities Management**
 - Organization
 - Goals
 - Purpose
 - Strategy
 - Best Practices
- **Rules and Requirements**
 - NASA Space Act
 - Executive Orders
 - Agency Policies and Processes
 - Funds Management
- **Recommendations**



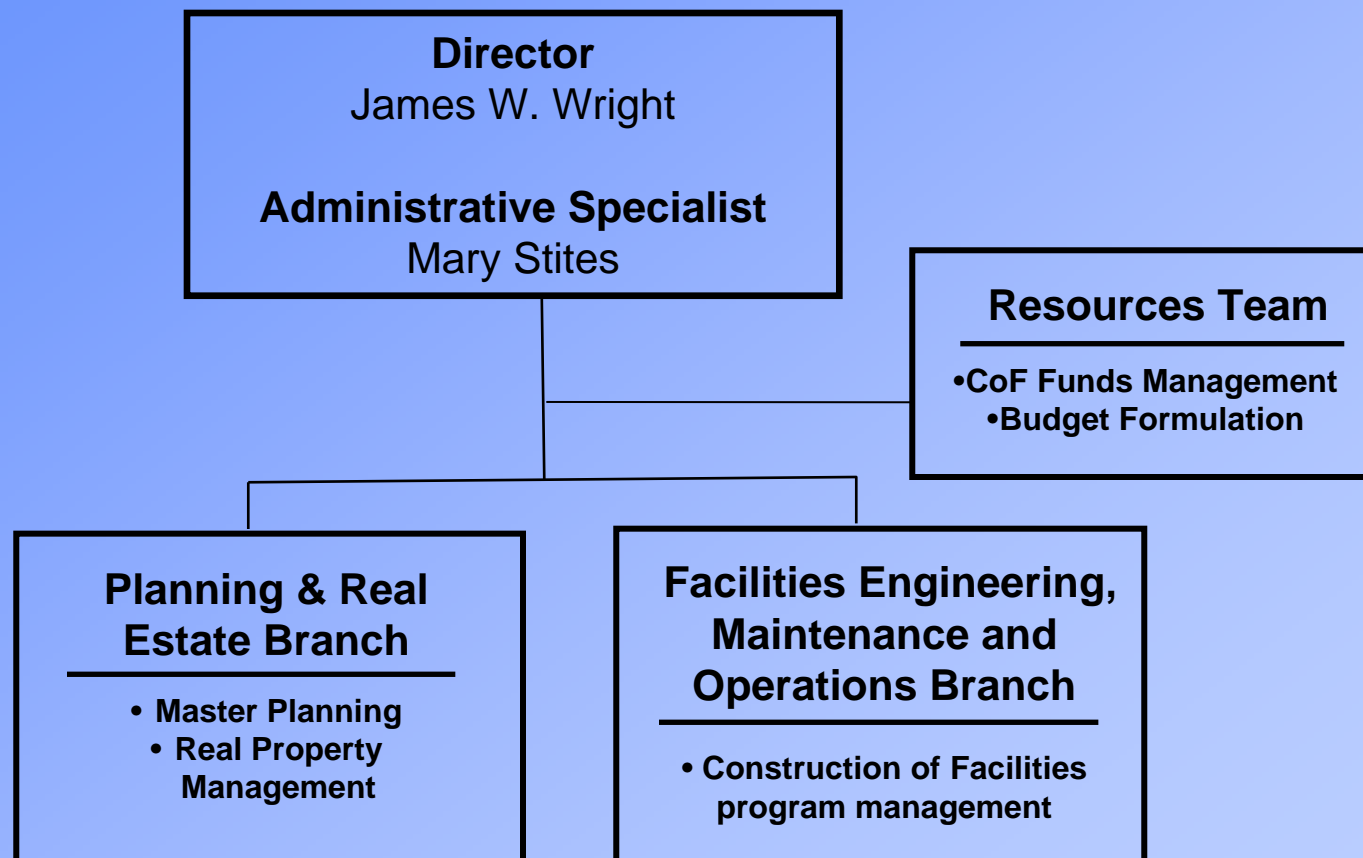
Organization Chart





Facilities Engineering and Real Property Division

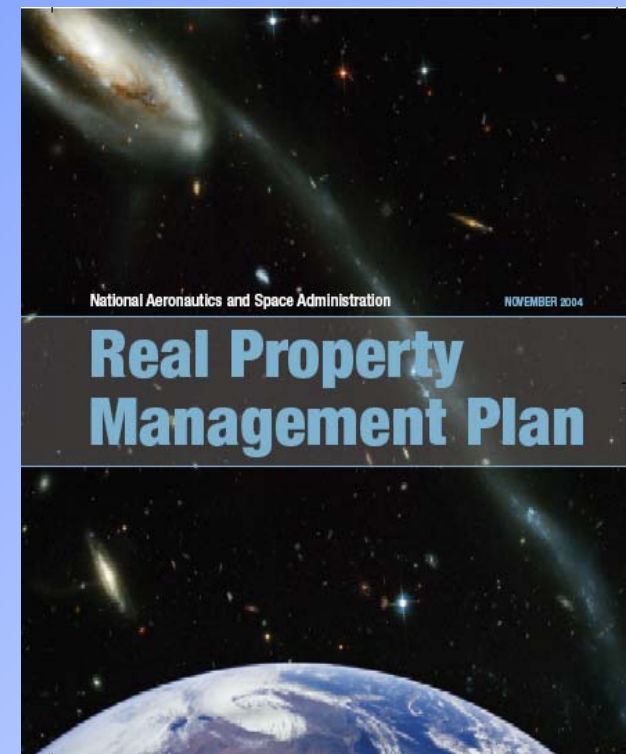
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Real Property Management Plan Goals

1. Identify and address real property requirements as an integral part of Agency, Mission Directorate, program, and project planning.
2. **Construct and operate new real property to meet mission requirements only when existing capabilities cannot be effectively used or modified.**
3. Continually evaluate its real property assets to ensure alignment with the NASA Mission.
4. Leverage its real property to its maximum potential.
5. Sustain, revitalize, and modernize its real property required by the NASA Mission.





Real Property

- Definition: land, buildings, structures, utilities systems, and improvements and appurtenances thereto, permanently annexed to land
 - Includes collateral equipment
 - Building-type equipment, built-in equipment, and large, substantially affixed equipment normally acquired and installed as a part of a facility project



CoF Program Purpose

- Acquire, repair, modify, and/or construct real property to support and accomplish NASA's missions
- **Comply with Public Laws**
 - National Aeronautics and Space Act of 1958
 - Appropriation Act
 - Authorization Act
 - Executive Orders



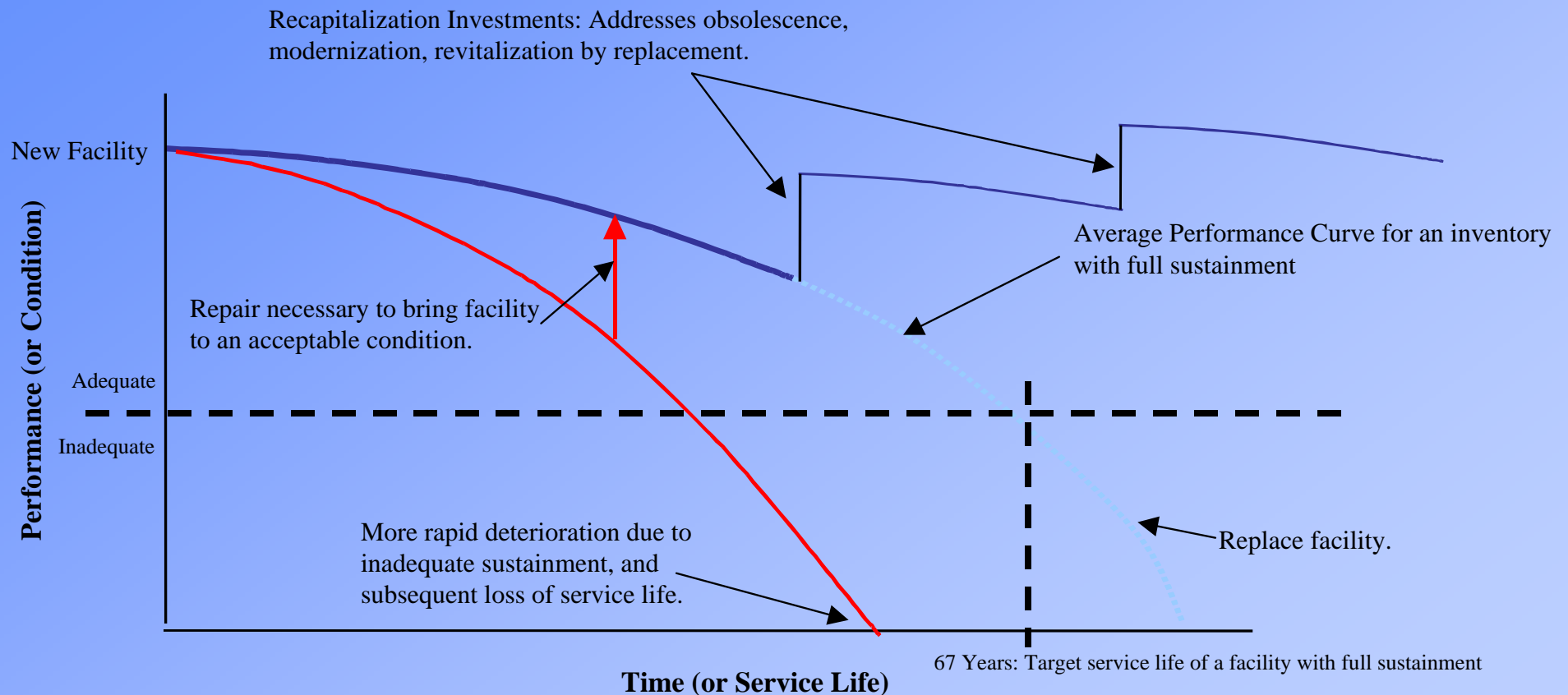
Facilities Strategy

- Facilities supporting the mission:
 - Invest in facility maintenance, repair, replacement
 - Invest in sustainable operations, design and construction techniques when economically justified
- And the others:
 - **Eliminate**
 - Demolition Program
 - Other real property solutions (transfer, excess)



Facility Life Cycle

Facility Life-Cycle Performance Curve





Facilities Benchmarking

- Construction Industry Institute
 - Over 100 Organizations
 - Industry
 - Government
 - Academia
- Federal Facilities Council
 - 25 Federal Agencies
 - GSA
 - Department of State
 - Department of Defense (DoD)



CoF Best Practices

- Front End Planning
- Partnering
- Team Building
- Constructability
- Value Management
- Sustainability
 - Sustainable Design
 - Design for Maintainability
 - Total Building Commissioning
 - Design for Safety and Security
- Construction Safety
 - Making Zero Incidents a Reality



National Aeronautics And Space Act

- **Authorization***
 - TITLE II, Section 203, (c), (3)
 - Authorizes construction, improvements, for laboratories, research & testing sites & facilities as deemed necessary
- **IMPACT:** NASA can acquire, construct and repair real property without going through GSA (or any other Agency).

* **Authorization** - is a legislative act authorizing money to be spent for government programs that specifies a maximum spending level **without provision for actual funds.**



National Aeronautics And Space Act

- **Appropriations**

- Title III, Section 310, (a)

- nothing in this Act shall authorize the appropriation of any amount for (1) the acquisition or condemnation of any real property, or (2) any other item of a capital nature (such as plant or facility acquisition, construction, or expansion) which exceeds \$250,000.

- Impact: All of our CoF appropriations come to us through public laws (i.e. President's Budget and Congress)



Additional Real Property Requirements

- Executive Order 13327, Federal Real Property Asset Management
 - Real Property Asset Management Plan
- Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management
 - Sets new energy efficiency standards
- Center Master Plans



Policies & Procedures

- NASA Policy Directive (NPD) 7330.1G
Approval Authorities for Facility Projects
 - NPD 8820.2C, Design and Construction of
Facilities
 - *NASA Procedural Requirements (NPR)
8820.2F, Facility Project Requirements
- *Revision in process for approval and signature at the time of this slide presentation submittal. NPR 8820.2E may still be in effect.



CoF and NPR 7120.5 Series

- NPR 7120.X Series refers to NPR 8820.2
 - For CoF processes and facility project requirements
- NPR 8820.2 refers to NPR 7120.5D
 - **When a facility project is also a project per NPR 7120.5D, both policies apply**
 - No duplication of effort is required, but elements from both documents must be met



SYSTEMS ENGINEERING

NPR 7123.1

- Application of this NPR to Construction of Facilities (CoF)
 - Scaled to level of systems engineering for function of structure
 - Documented in systems engineering management plan (SEMP) (as required)
 - Refers to NPR 8820.2 for CoF engineering requirements
- NPR 8820.2 refers to NPR 7123.1



CoF Project Types

- Institutional (Prioritized Agencywide):
 - Common use facilities, such as primary utility distribution systems, general administrative buildings, roads, parking lots, and quality of life facilities
- Program Direct (Prioritized within each Program):
 - Facilities required to satisfy Program specific requirements/capabilities (e.g. test facilities, labs, R&D)



CoF Process

**Identify
Required Capability**

**Functional
Requirements Statement**

**Facility
Concept Study**

**Environmental
Evaluation**

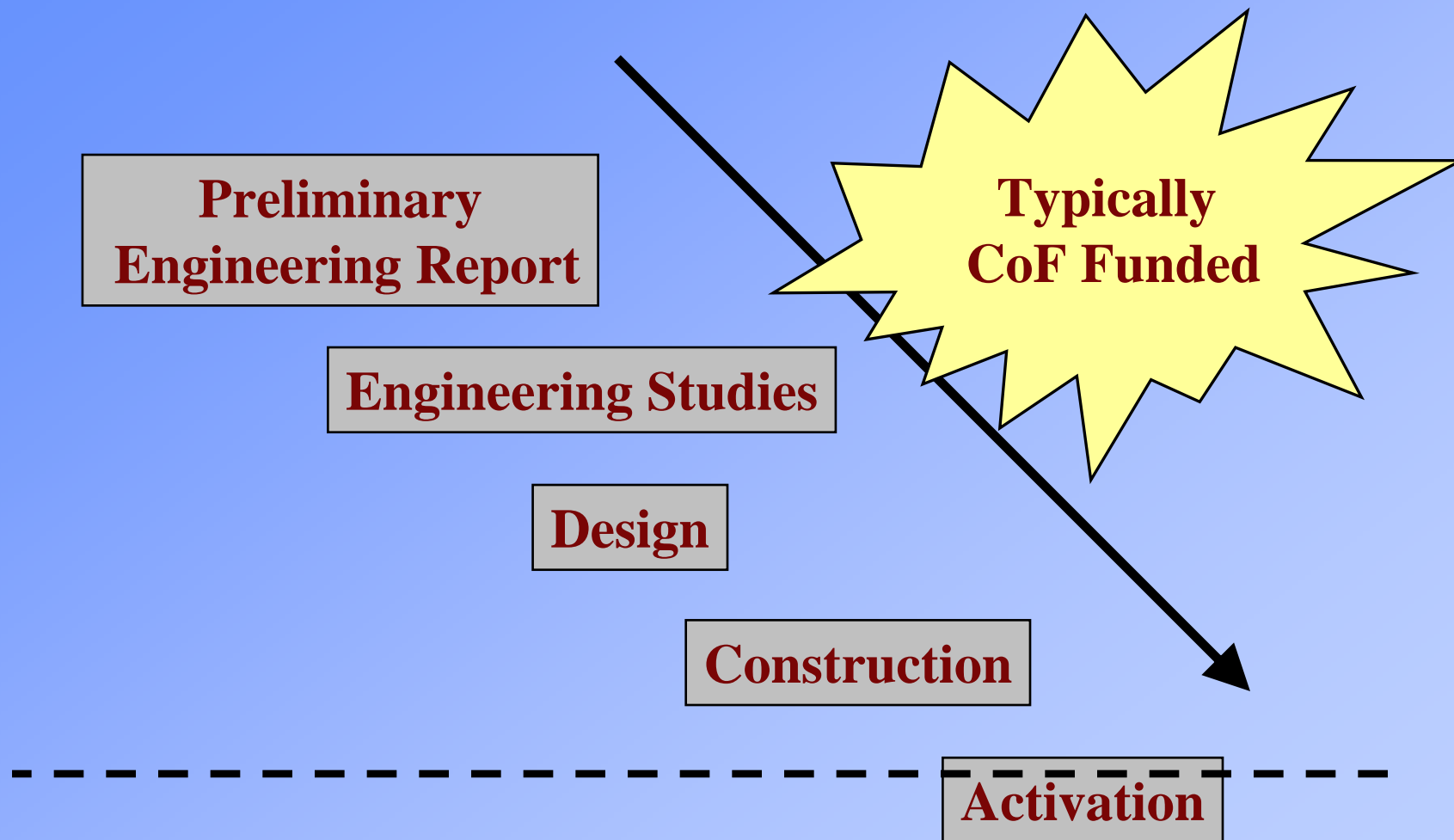
Perform Studies

Requirements Document

**These are Not Typically
CoF Funded**

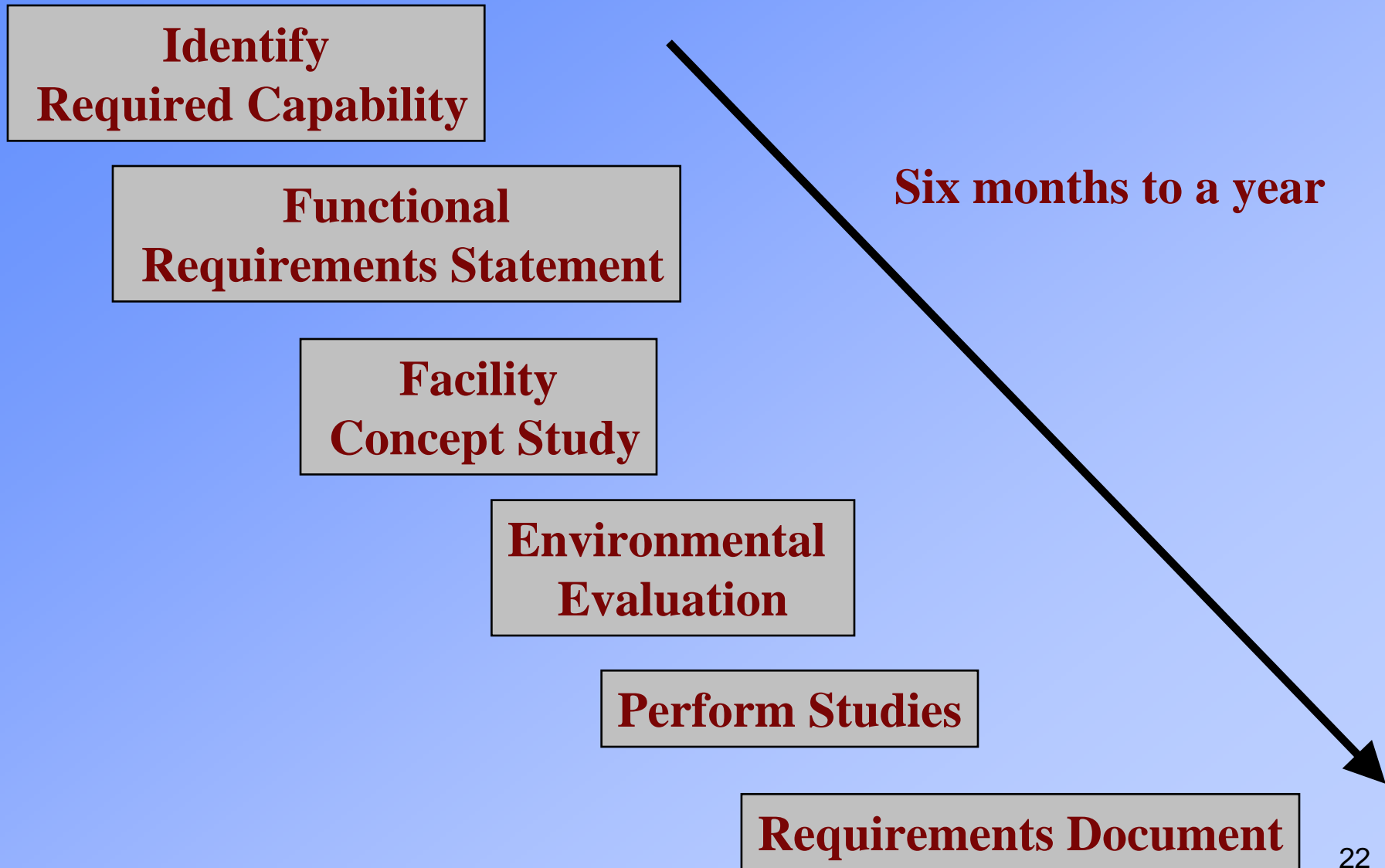


CoF Process



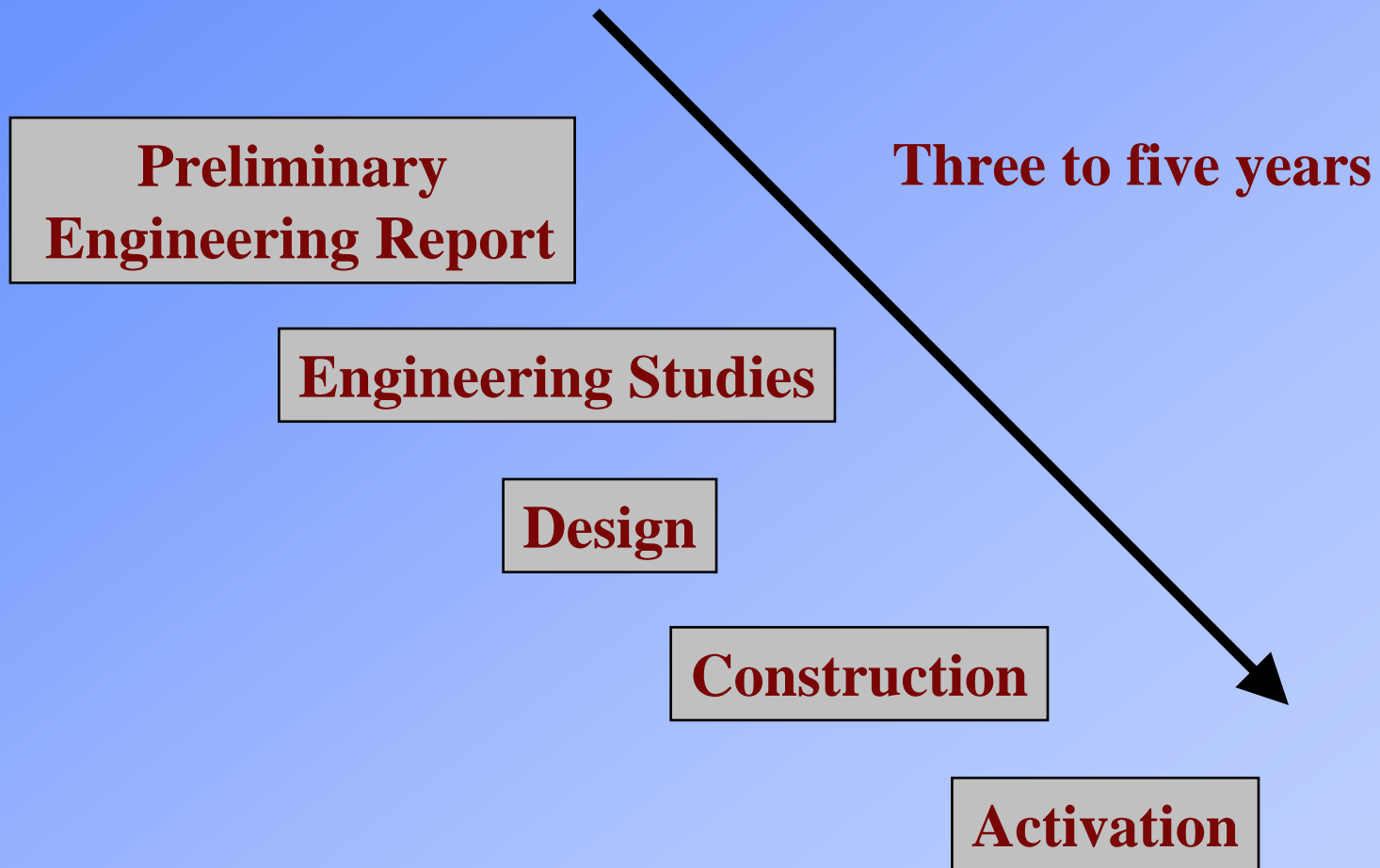


CoF Typical Timeline





CoF Typical Timeline





CoF Funding Categories

- Local Approval (Center budgeted)
 - Any project costing less than \$500,000
 - Not included within the Agency CoF Program
- Minor Revitalization and Repair
 - \$500,000 and less than \$5,000,000
- Discrete
 - \$5,000,000 and up
- Demolition
 - No funding limits
 - Not exclusively CoF Program funded
- Facilities Planning and Design



CoF Funding Rules Outside of the Normal Budget Process

- Upward variations into the CoF Program (Institutional Investment)
 - Limited to 10% of the appropriated programs affected or \$750,000 whichever is less
- Operating Plan Changes
 - Any project change in excess of the upward variation rules



Recommendations

- New capabilities
 - *Notify Facilities Organization (Center or HQ) as early as possible to get your facility needs into the budget
 - Existing Capabilities
 - *Ensure the Center Facilities Organization is aware of your need for the facility
 - Fully define your facility requirements
 - Schedule, Cost, and Scope
- *Note: Even if you don't know your complete facility requirements yet.



Questions?



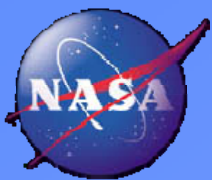
BACKUP Slides



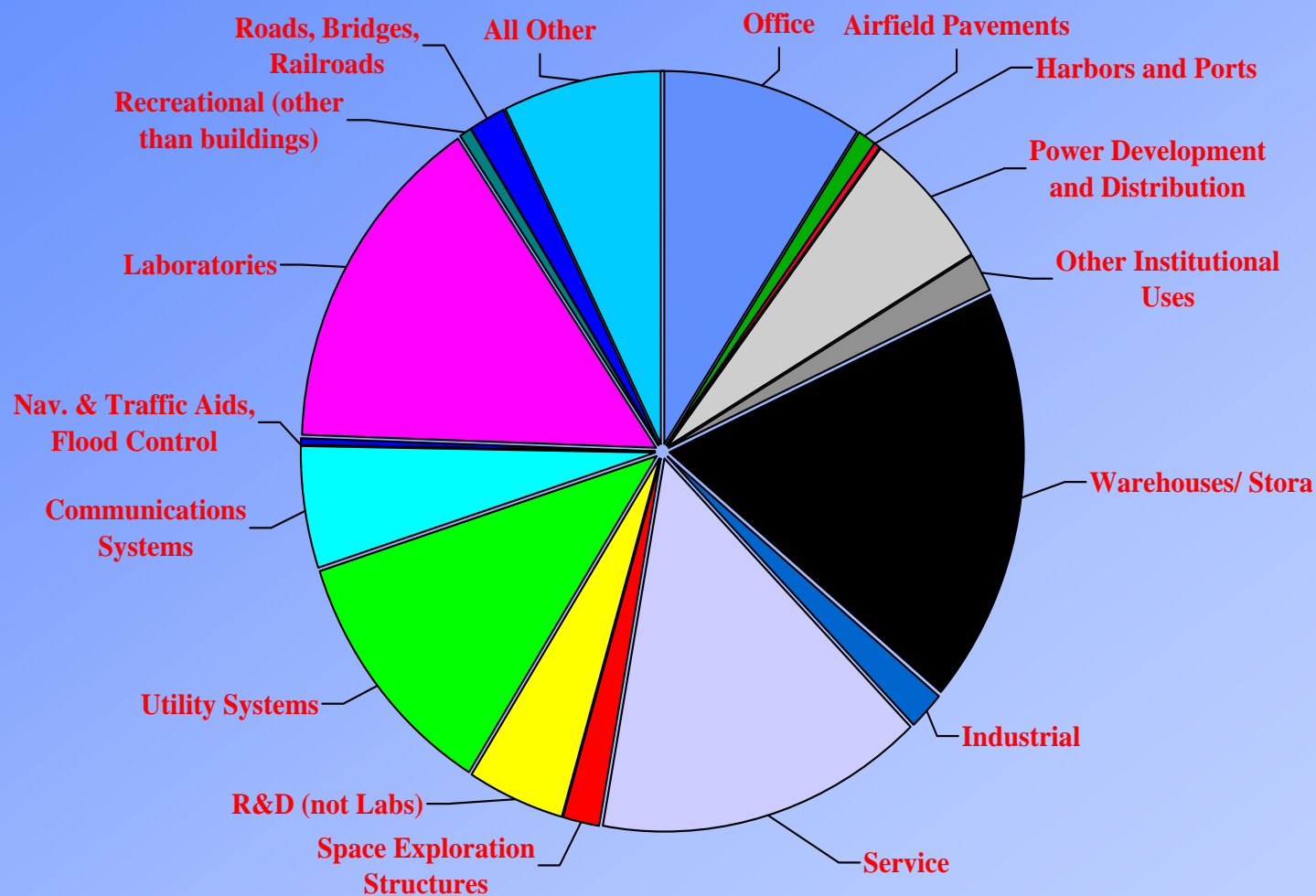
NASA Real Property

- Just the Facts:
 - Over 2500 Buildings
 - Over 2300 Other Structures
 - Over \$23 Billion Current Replacement Value
 - Over 40 Million Square Feet
 - Over 360,000 Acres
 - Aged, high technology facilities.



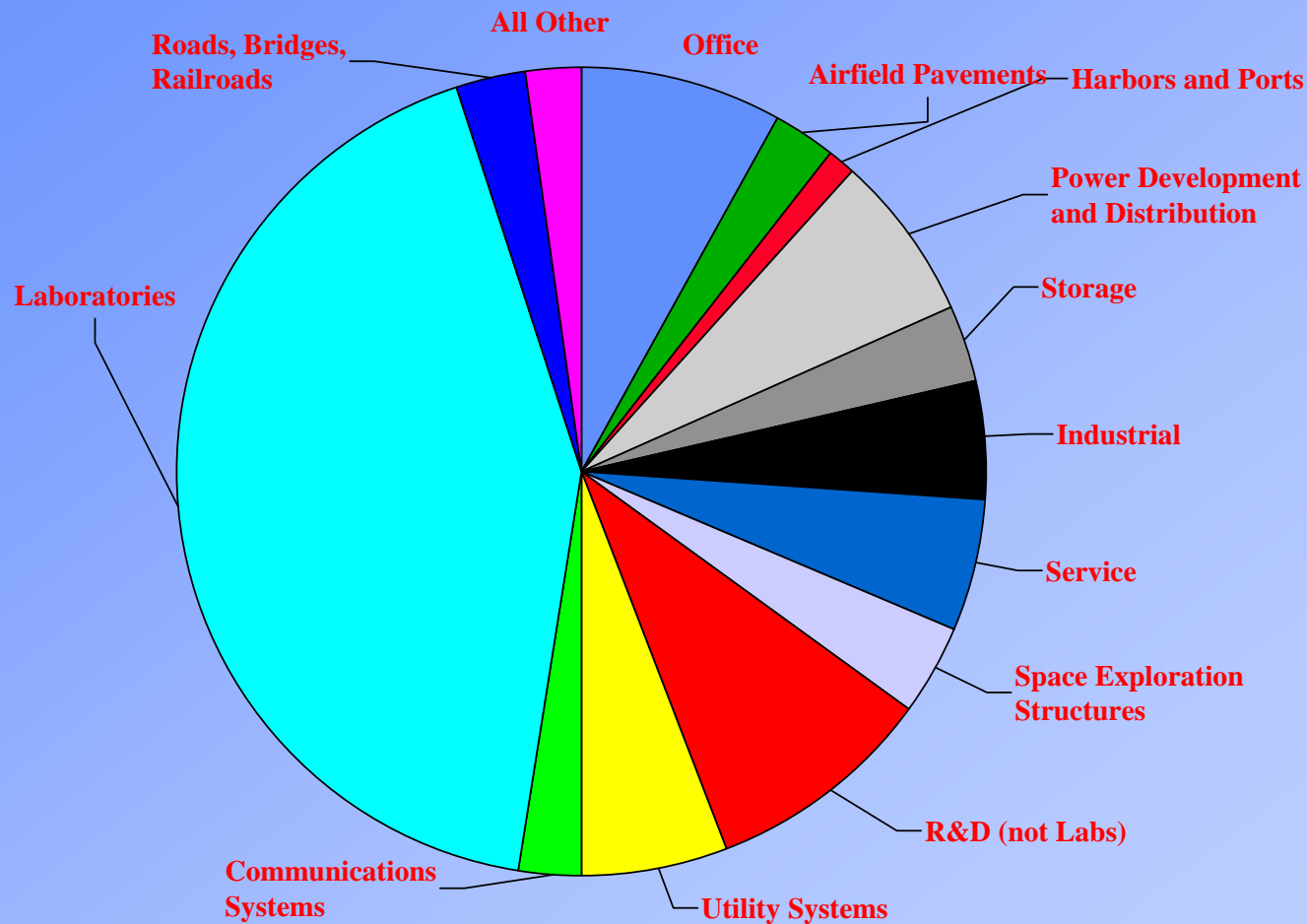


Facility by Type (# of facilities)





Facilities by Type (replacement value)

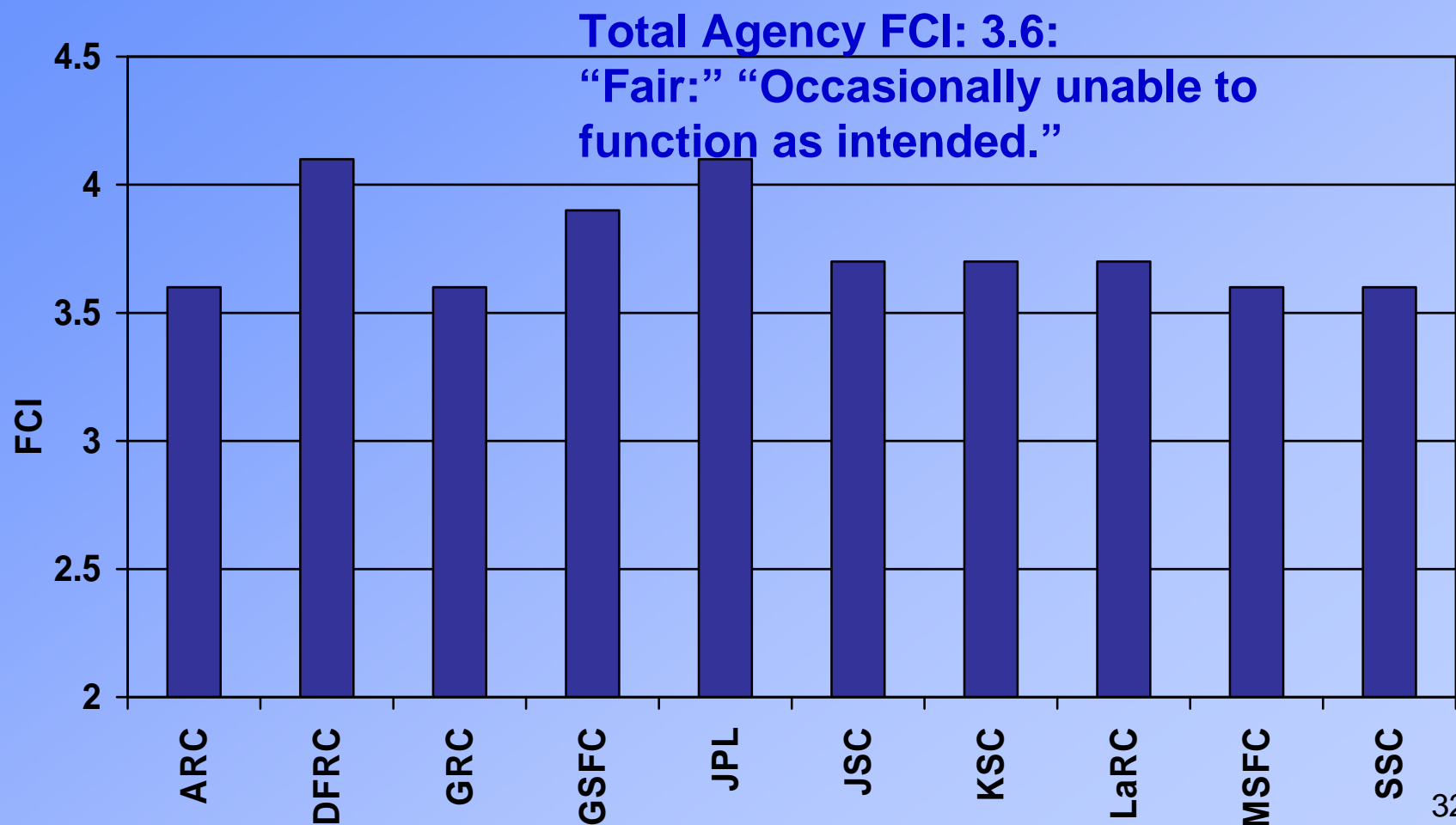


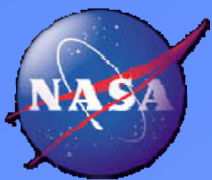
From RPI
February 2006



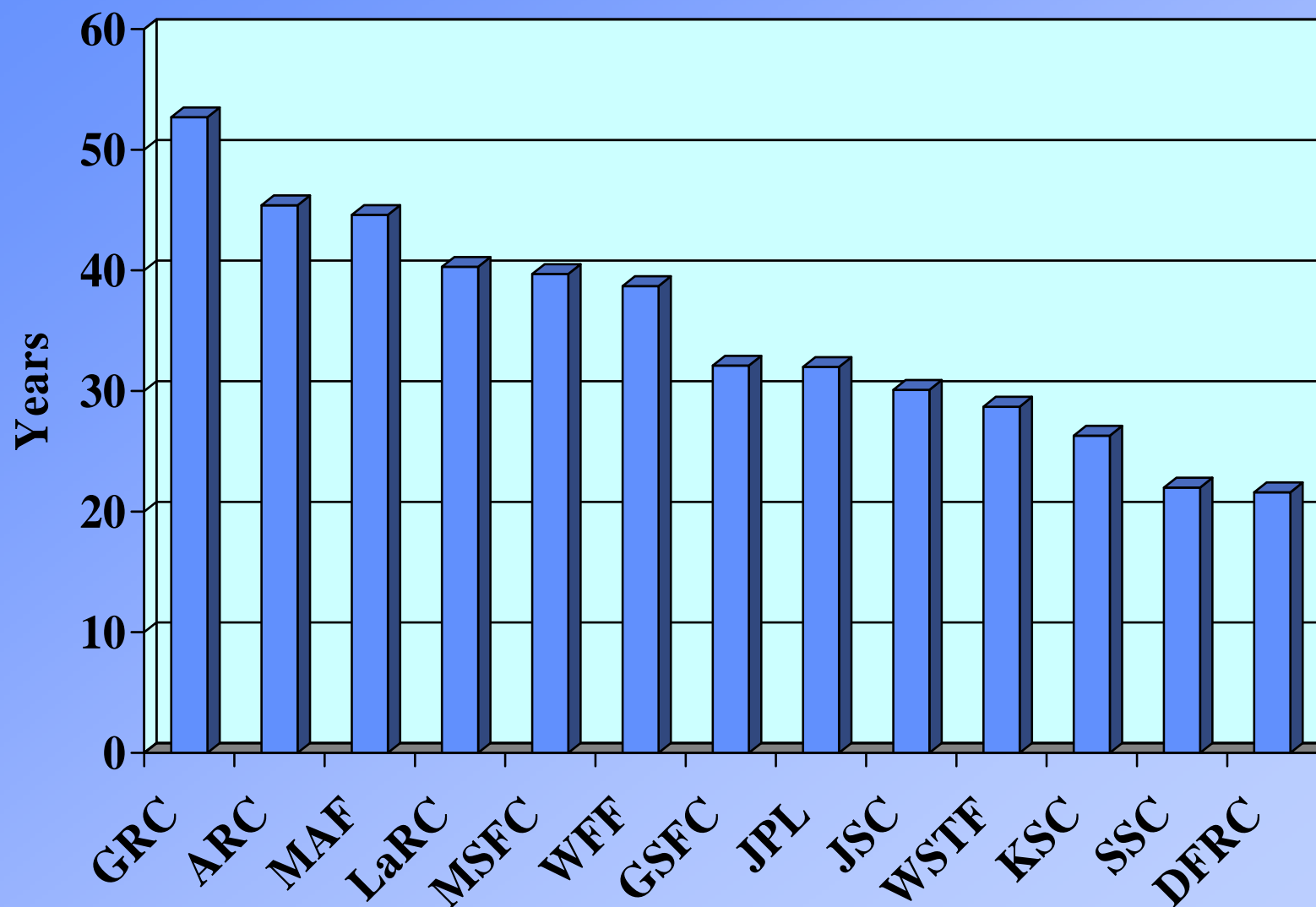
FY06 Facility Condition Index by Center (Active Facilities Only)

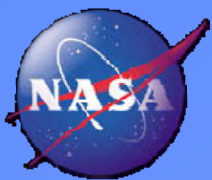
Based on a parametric model, 5 point scale (1 – Poor, Unable to meet intended function; 5 – Very Good, fully functional with no significant repairs required). FCI is calculated annually, based on 100% inspection of all NASA facilities.



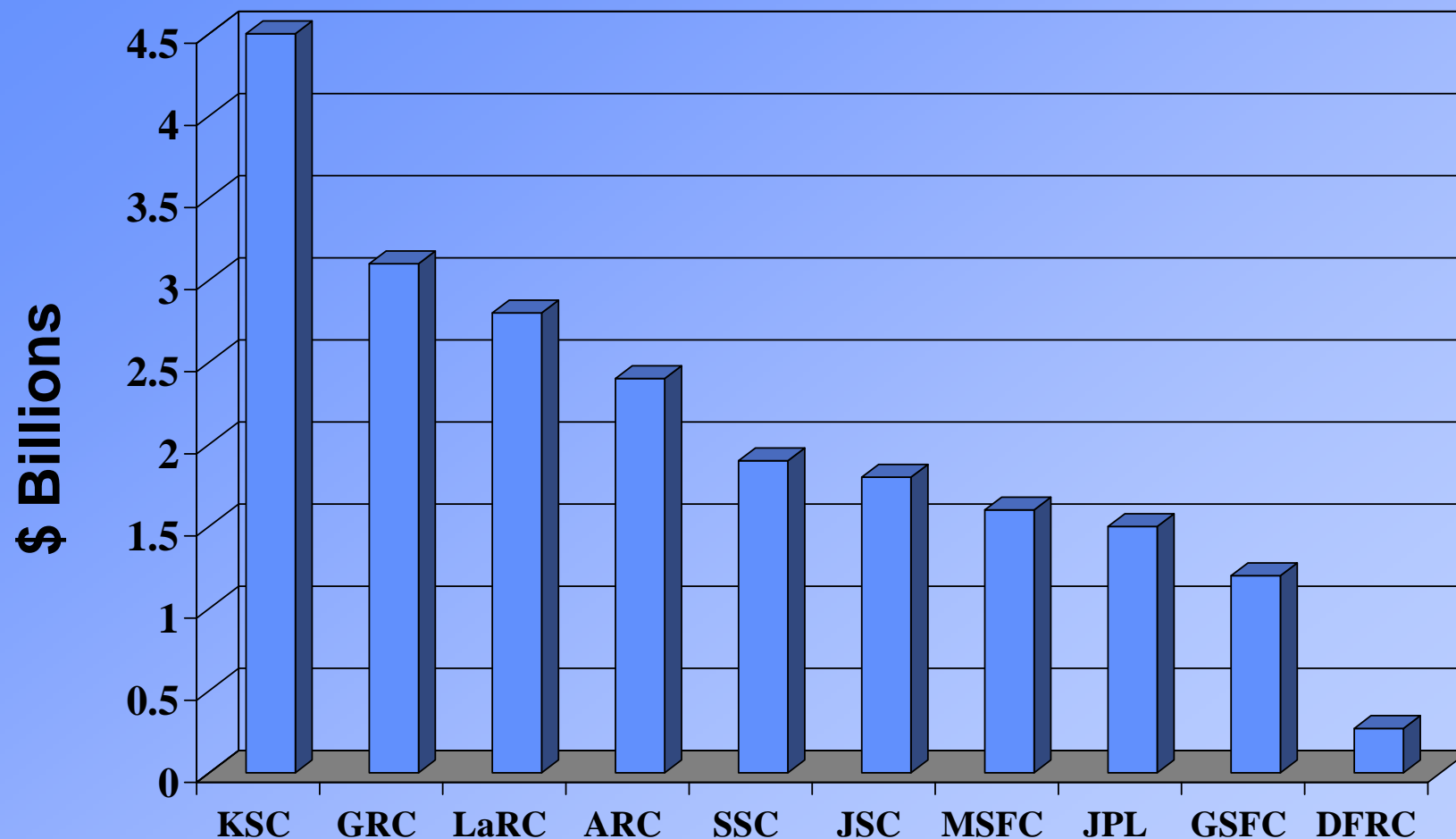


Average Facility Age

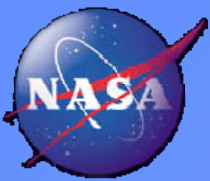




Total Current Replacement Value by Center

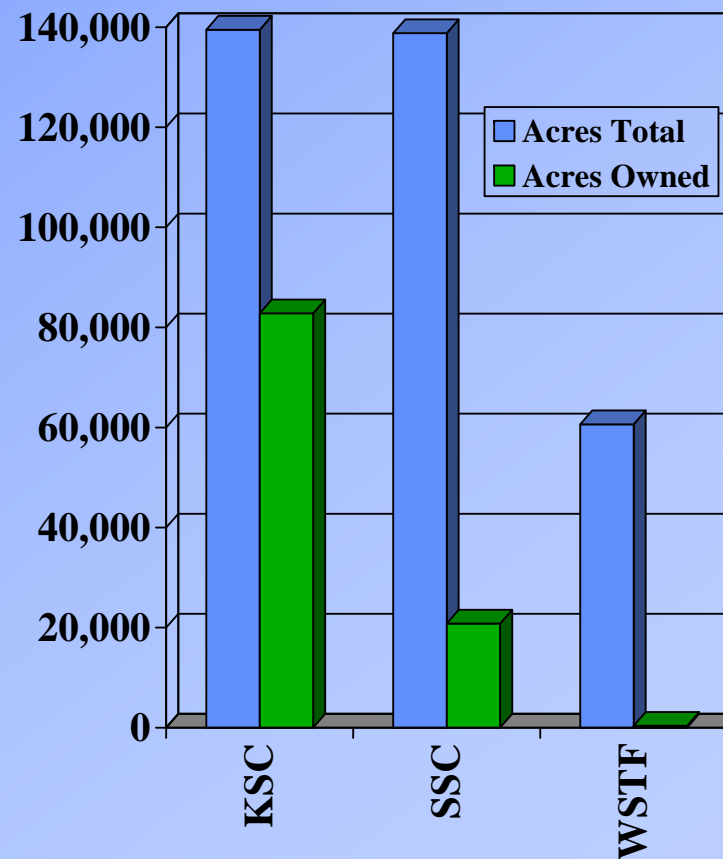
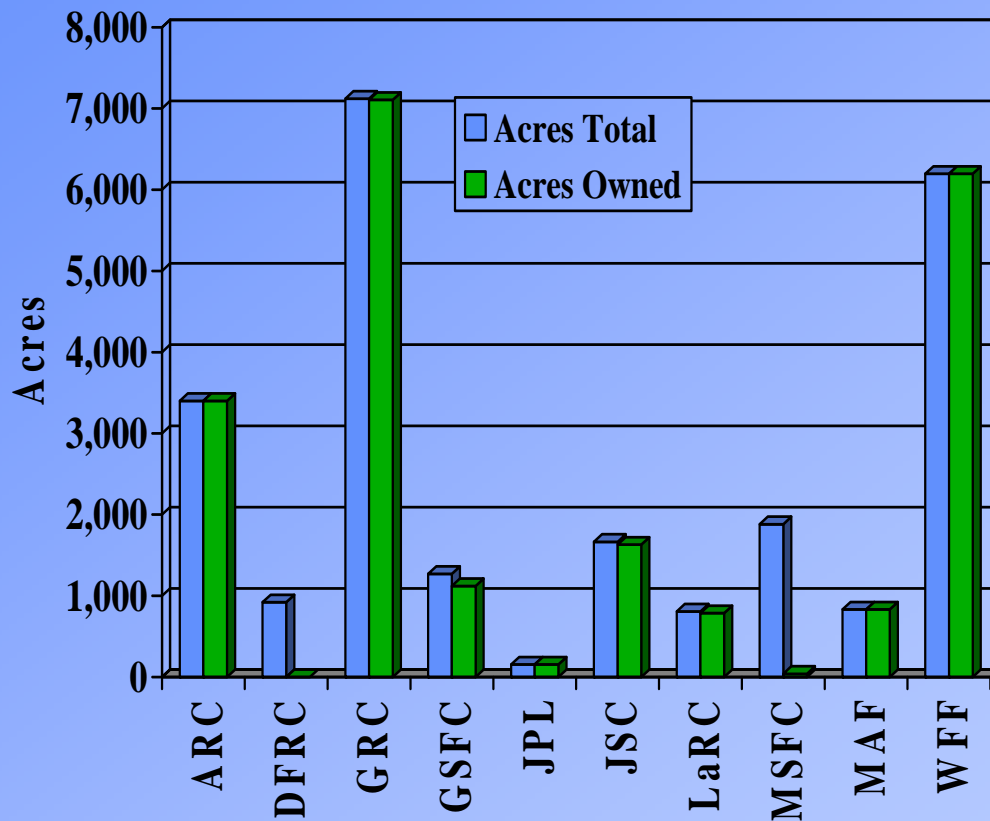


Note: Includes both Active & Inactive Facilities



Acreage by Center

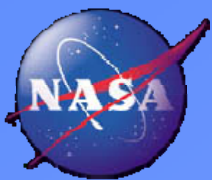
NASA owns 125,276 acres
Controls another 237,901 acres
Total 363,177 acres





Facilities Life Lines

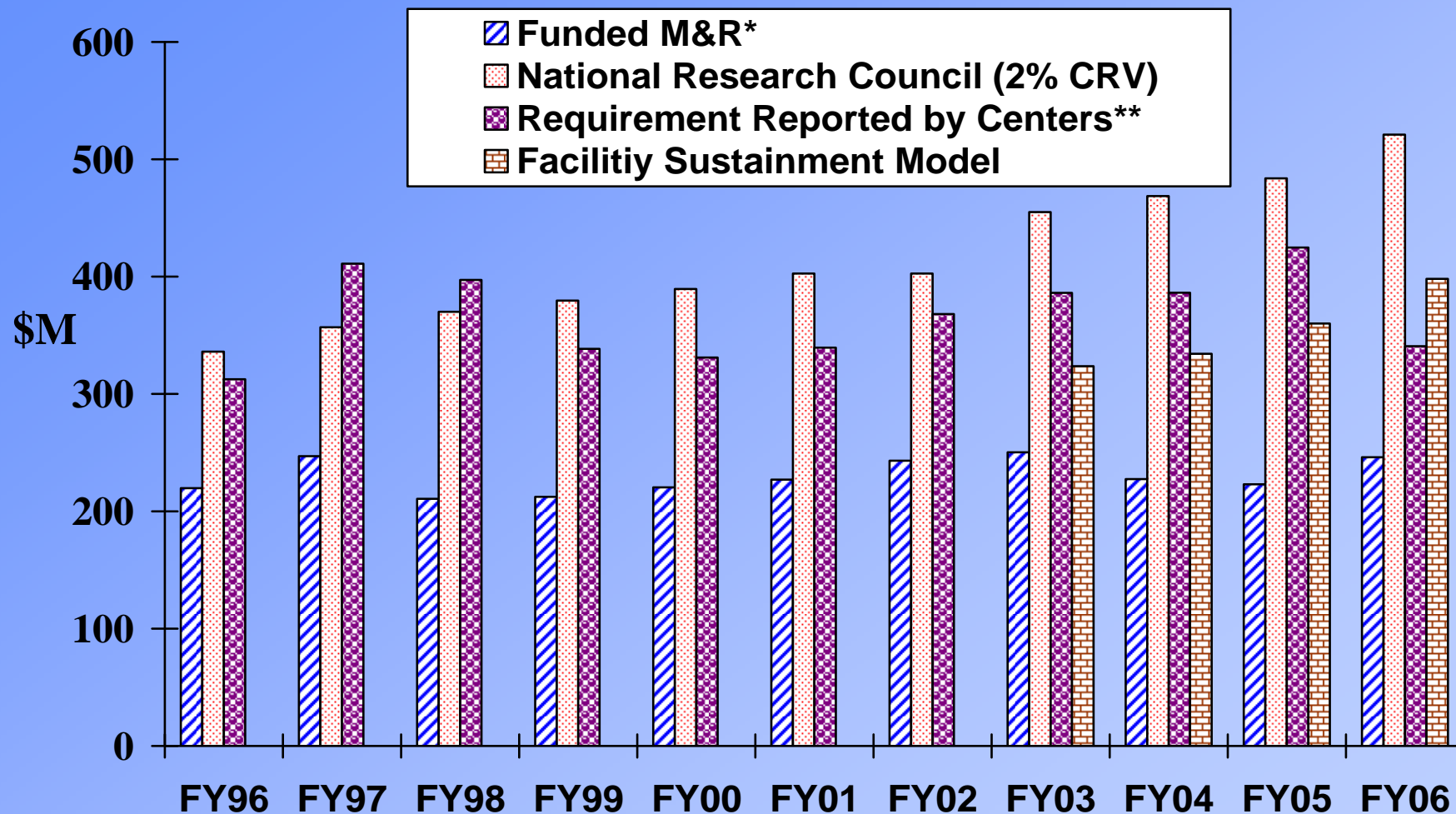
- **Construction of Facilities (CoF)**
 - FERPD budgeted, managed and funded for Institutional projects
 - Discrete - \$5 M and over (no year)
 - Minor Revitalization and Construction - \$500K-\$5M (3 year)
 - Demolition – \$0 and up (no year)
 - Facility Planning and Design (FP&D) (3 year)
 - Studies, Preliminary Engineering Report (PER), Designs
 - **Full Cost** (2 year)
 - Full Time Equivalents (FTE), Travel, Contractor Support
- **Center Management and Operations (CM&O)**
 - Facilities Projects (under \$500K)
 - Facility Operations and Maintenance
 - FERPD provides advocacy and sets Agency policy



Facilities Engineering and Real Property Division

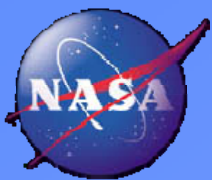
Facilities Maintenance Assessment

Not corrected for inflation

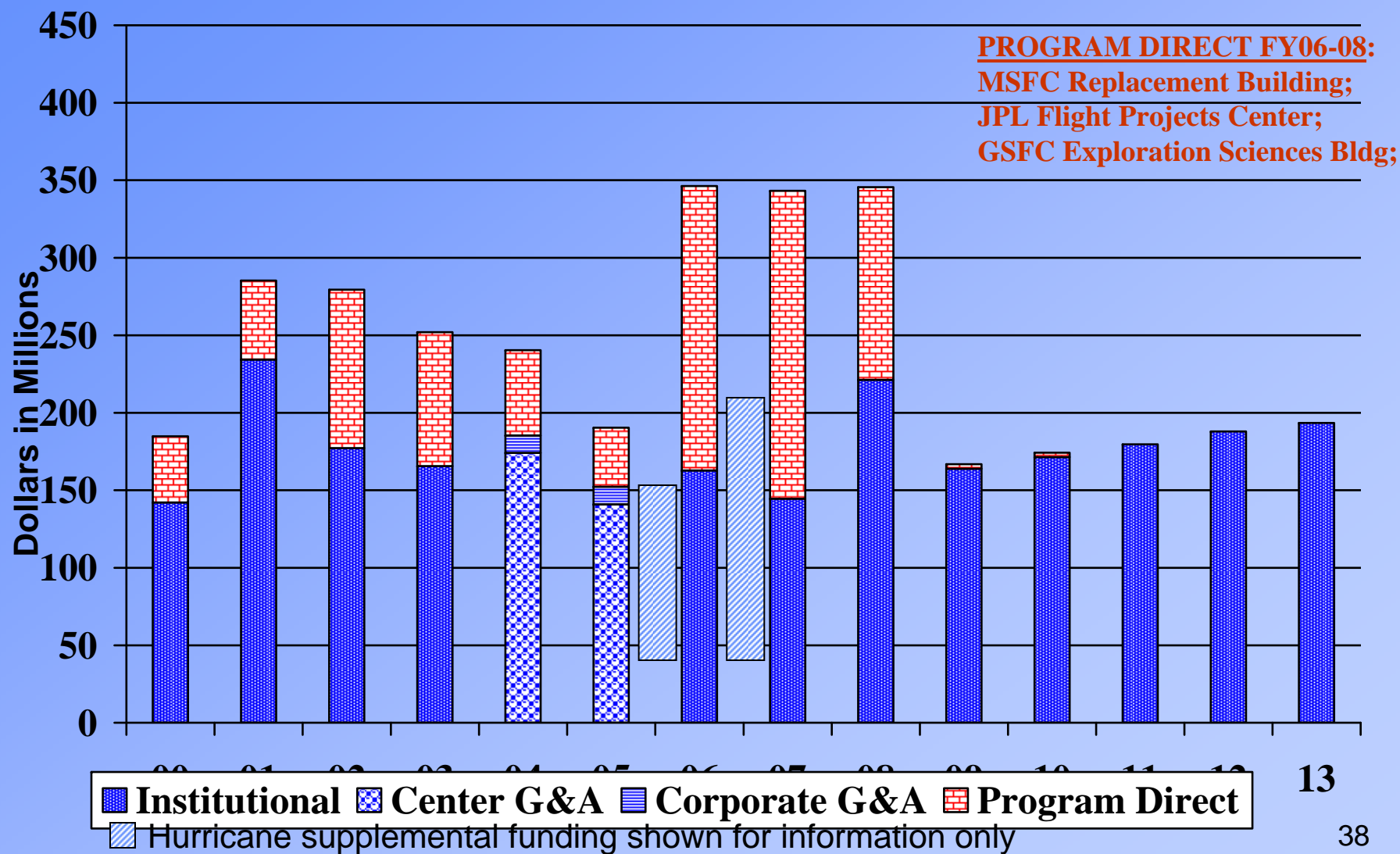


*M&R defined as the recurring day-to-day work required to preserve facilities (buildings, structures, grounds, utility systems, and collateral equipment) in such a condition that they may be used for their designated purpose over an intended service or design life. (non-CoF)

** M&R Requirement = Center request for adequate maintenance and stable repair backlog.



CoF Funding 2000-2013 (Procurement Only)





FY 07 PPBES CoF Prioritization

- Uses a Risk Management Approach (5 by 5 Matrix)
 - Project must be mission related
 - Probability and Consequences Plotted
 - Discerning factors delineate between projects with same score
- Final prioritization is done by a team made up of members from each Center, Mission Directorates, and Mission Support Offices
- Establishes Agency CoF Priorities
- CoF Prioritization Timeline – driven by HQ Office of the Chief Financial Officer



CoF Prioritization Results (FY 09)

- Over **\$174 M** was initially scored as **Very High** Risk (Probability 5, Consequence 5)
- After scrubbing the list, we were able to add in some **High** risk (5,4 or 4,5)
- **Consensus** process (using color coded cards)
- Open process with buy in from all

| Center | Total |
|--------|---------|
| ARC | 10,140 |
| DFRC | 8,800 |
| GRC | 10,200 |
| GSFC | 10,200 |
| JPL | 10,100 |
| JSC | 19,950 |
| KSC | 23,600 |
| LaRC | 10,200 |
| MSFC | 14,800 |
| SSC | 5,900 |
| Total | 123,890 |



CoF Demolition Program

- Headquarters provides funding
 - \$10M per year, FY04 through FY07; \$15 M for FY08 and beyond
 - Saves costs and improves overall condition by removing unneeded facilities
 - From NASA's FY05 Deferred Maintenance Report: "NASA's aggressive demolition program (in FY04-05), **117 facilities**, accounted for a **DM reduction of \$17 million**...\$64 million reduction in FY04...\$98 M in FY05"
 - Removes safety and environmental hazards
- Demolition also required as part of repair by replacement
- Centers also fund demolition projects
- Deconstruction techniques are used to offset costs (e.g. salvaging steel and copper)



Institutional CoF Issues

- **Significantly under-funded**
 - Recent data call identified **\$484 M** in requirements for FY 2009 consideration through prioritization
 - \$174 M was **Very High** risk to mission
 - \$97 M was **High** risk to mission
 - \$124 M available for FY 2009 prioritization
- **Impact:**
 - Risk to infrastructure will increase (recent incidents of fires at JSC and GRC), increasing risk to mission
 - Reactive mode for natural/manmade disasters
 - System failures redirect scarce funds (GRC electrical fire)



Coming CoF Tools

- **Building Information Modeling**
 - Software used to model a facility
- **Facilities Project Management Database**
 - GRC developed
 - Focus on project execution phases
 - Design, Construction
 - May soon be “required” method for receiving CoF funds



Other Real Property Initiatives

- Shared Capabilities Assets Program
- Sustainable design and construction
- Healthy Buildings (Indoor Air Quality – IAQ)
- Construction Safety
- Reliability Centered Maintenance
- Full Cost Management and use of Working Capital Fund
- Integrated Asset Management